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CONTENTS

	Page
1. Some Roentgen Manifestations of Acute Abdominal Disease William R. Eyler, M.D.	2
2. Polyostotic Fibrous Dysplasia, Case Report and Discussion John R. Caldwell, M.D.	7
3. Misuse of Words Eugene J. Alexander, M.D.	11
4. Hyperthyroidism, Two Cases Demonstrating It's Inception During Cortisone and Thyroid Therapy Raymond C. Mellinger, M.D. and Richmomd W. Smith, Jr., M.D.	13
5. An Appliance for the Non-Operative Relief of Paralytic Foot Drop John Lyford, III, M.D.	18
6. Certain Fundamentals of Pressure Recording Richard E. Shipley, M.D.	21
7. Serious Hypotension Following Seafood Ingestion John H. Burger, M.D., K. Charles Wright, M.D., and Joseph H. Shaffer, M.D.	28
8. Abstracts of Recent Publications by the Professional Staff of the Henry Ford Hospital and the Edsel B. Ford Institute for Medical Research	33

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SOME ROENTGEN MANIFESTATIONS OF ACUTE ABDOMINAL DISEASE

WILLIAM R. EYLER, M.D.*

The roentgen examination of a patient who presents acute abdominal symptoms is of most value when the clinician is not able to make an exact diagnosis by other means. The abdominal film may be of help, however, in confirming a specific diagnosis in a patient with a classical history and findings or in excluding certain diagnoses in a problem case.

The examination may be started with a plain film with the patient supine and additional projections then obtained as indicated; or, preferably with at least one film made with horizontal beam and the patient in the erect or lateral decubitus position. Frequently a chest film may also be helpful. A barium enema to confirm or exclude the large intestine as the site of abnormality should be done whenever the evidence is otherwise inconclusive. Unless a specific diagnosis can be made, patients with small bowel dilatation should often be studied by barium enema, as an incompetent ileo-cecal valve may cause the abnormality otherwise to be incorrectly described.

An attempt to interpret films of any kind without clinical information (with the possible exception of mass survey chest films) is not to be condoned. The radiologist cannot offer much help without such information. No attempt will be made to survey all the conditions or all the roentgen signs of acute disease, but a discussion of some of the specific appearances will be attempted.

Intrathoracic disease may produce acute abdominal signs and symptoms. Among the most frequent causes of error in selecting the abdomen as the primary site of the disease are lower lobe infarct or pneumonia and dissecting aneurysm of the aorta. Infarct may not produce its changes in the chest film for as long as forty-eight hours after the event occurs but pneumonia is usually apparent at the time of the examination. Dissecting aneurysm should be recognizable by widening of the mediastinum, loss of sharp aortic contours, signs of previous hypertension, and sometimes penetration of blood into the lungs. Films of the abdomen may show the effects of vascular insufficiency if the dissection has extended inferiorly or may show reflex ileus from the chest pain.

Vascular disease in the abdomen may cause acute symptoms. Arteriosclerotic aneurysms should be readily identified on plain scout films as fine linear calcifications usually seen best just to the left of the lumbar spine, but a better demonstration is provided by a lateral view. If there is considerable oozing from the aneurysm, the psoas shadows may be obscured and the bowel or a ureter displaced. Mesenteric arterial or venous thrombosis usually causes dilatation of the small bowel with gas and fluid; often there will be an unusually large amount of fluid in the infarcted loops with relatively less gas. Loss of mucosal folds and fine serrations are noted if contrast material enters infarcted bowel.

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The diagnosis of the ileo-colic type of intussusception, particularly common in early childhood, should ordinarily be made or strongly suspected on plain films without contrast material. The absence of the cecum from its usual position and air filling of small bowel loops in the right lower quadrant are highly suggestive. Small bowel loops following the course of the transverse colon, the arrowhead shape of air entering the proximal end of the intussusception and often air outlining the entire intussuscepted mass are confirmatory. In those patients with symptoms of only moderate severity or of short duration, the barium eneme is both a conclusive diagnostic measure and a therapeutic one as a gentle hydrostatic reduction has many obvious advantages. When contrast material is introduced it is easier to see the coil spring appearance of intestine within intestine. In adults it is more common for polyp or tumor to lead the intussusception rather than the bowel or its associated lymph nodes as is the case most frequently in children. Adenomatous polyp, lipoma, and carcinoma of the right colon all may produce the typical appearance. It is much less common to recognize an intussusception in the left colon, but the same lesions in this portion of the bowel may produce the same manifestations. Meckel's diverticulum may cause ileo-ileal intussusception.

On occasion, ingested material may cause small bowel obstruction. A case of upper jejunal obstruction resulting from the ingestion of a cup of hydrophilic colloid laxative is one of the more bizarre examples. This agent caused air distention of upper jejunum (shown by closely spaced valvulae conniventes) and caused fluid density in the loop it filled and obstructed.

Biliary tract disease may result in intestinal obstruction or deformity in several fashions. The most classic is doubtless the so called gall stone ileus in which a gall stone ulcerates through the gall bladder and into the small intestine, typically lodging in and obstructing the distal ileum. Aside from the recognition of the stone, the characteristic feature is air within the biliary tree or in the gall bladder itself. A distended gall bladder may be recognized as a mass or may produce deformity of the duodenal loop or the right transverse colon.

Several types of hernia produce intestinal obstruction and they too may be demonstrated radiologically. Often an air filled loop may be seen protruding from the abdomen in the inguinal or femoral regions and if contrast material is introduced either from above or below, the actual hernia may be demonstrated. Ordinarily contrast material would not be used in these two areas. Hernia through the foramen of Morgagni is not rare; the most common structure to enter this hernia is omental fat. Following this however, the colon, stomach, duodenum, spleen, pancreas and liver may enter. Roentgen recognition involves indentifying the position and character of the air filled bowel and realizing that it lies within the lower chest rather than beneath an elevated diaphragm. The use of the Miller Abbott tube to deflate the portions of the upper gastro-intestinal tract then enables one to make a definite distinction between the upper and lower gastro-intestinal elements entering the hernia. In lesser degrees of displacement, cephalad deviation of the transverse colon and the antrum of the stomach are diagnostic signs.

Internal hernia or volvulus of the small bowel may occur in relation to many

peritoneal reflections or bands within the abdomen. The right and left paraduodenal fossae are among the most common sites. Such a hernia may cause air filling of the bowel proximal to the herniated portion and then distention of the trapped portion within the sac. The sharply localized collection of loops with generally rounded or ovoid contour should enable one to make or suspect this diagnosis. In children, particularly, mesenteric defects are a common cause. Not infrequently, herniation through the mesenteric defect will be associated with some volvulus which then produces infarction and sometimes perforation. (Fig. 1)

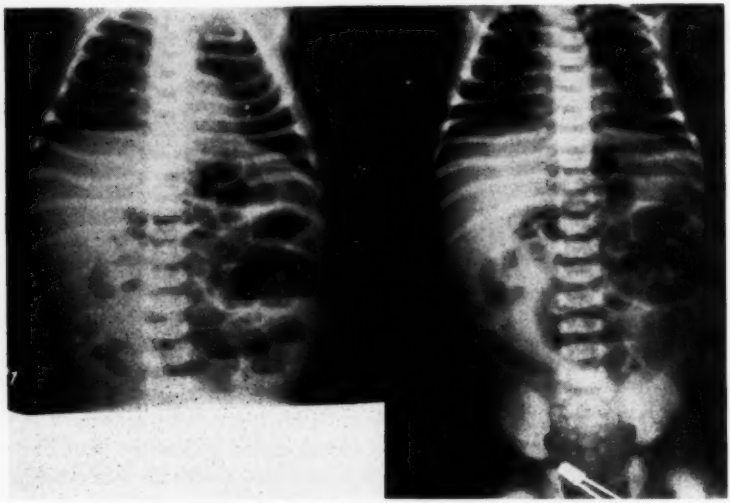

Fig. 1. Erect and supine films of the abdomen from a case of herniation of small bowel through mesenteric defect with resultant volvulus and infarction. Most of the small bowel was involved. The patient was 12 hours old.

Pneumoperitoneum should be recognized in a very high percentage of the cases in which it occurs. On the supine film one may be impressed first of all with a general over-all gray appearance to the film and this will be a darker gray than is caused by fluid alone. This statement also holds if there are considerable amounts of free fluid in the abdominal cavity as well. Free air can be seen against any of the peritoneal surfaces of the abdomen if a horizontal beam is employed; erect, lateral decubitus and supine films so obtained can all be useful under certain conditions. Smaller amounts of air in the peritoneum, particularly when the air is trapped, may be recognized by the air delineation of certain intraabdominal structures such as the falciform ligament which appears as a characteristic fine, sharp, oblique band in the right upper abdomen (Fig. 2), or the outlining of the outer wall of any portion of the gastro-intestinal tract. The falciform ligament, the stomach and the colon are the structures most commonly outlined on the supine film.

On occasion, the cecum may perforate in post-operative ileus even though the patient is not totally obstructed.

A much less common foreign agent in the peritoneal cavity is barium which ordinarily enters through a duodenal ulcer or a ruptured diverticulum of colon. Barium then may be seen outlining the intra-abdominal structures in a fashion quite similar to the air previously described except that the barium is heavier and tends to sink to the posterior portions of the abdomen. The outer walls of the gastro-intestinal tract are readily recognized. The barium initially in fluid suspension forms homogeneous appearing "smears" between the loops of bowel and around the other intra-abdominal structures. As times goes on, the barium tends more and more to be encapsulated in small globules and to be progressively removed from the abdomen apparently by phagocytic activity. Such patients may have repeated bouts of intestinal obstruction following this type of peritonitis.

Volvulus of the large intestine is much more common in the older age groups. Volvulus of the cecum and ascending colon should be readily recognized in all cases in which displacement of the cecum occurs, but some of the axial torsions are more difficult to recognize. Quite commonly the cecum becomes greatly dilated with gas and swings into the left upper quadrant when volvulus occurs; confirmation by barium study frequently discloses the beak shaped barium pattern of twisted mucosal folds at the site of the volvulus. These patients are sometimes able to evacuate some of the gas trapped in the cecum following the barium enema and thus on occasion it is therapeutic. Volvulus of the cecum is one of the conditions in which there is frequently considerable gas in the colon distal to the site of the mechanical obstruction. The recognition of the haustrations of the right colon and of the ileo-cecal valve or the characteristic shape of the tip of the cecum should enable one to make the diagnosis or suspect it and have it confirmed by barium enema.

Volvulus of the sigmoid presents an inverted "U" shaped distended loop of large intestine arising out of the pelvis and quite frequently swinging either to the midline or to the right of the mid line and often extending up to the level of the diaphragm. The lower ends frequently are pointed because of the twist. Fluid levels can be demonstrated by upright films and again barium will demonstrate the twisting of the mucosal folds. It is sometimes possible to treat these patients conservatively by a tube or proctoscopic deflation, following demonstration of the site of the twist. It is more common for a volvulus of the sigmoid to fill the whole abdomen than it is for volvulus of the cecum.

In any case of obstruction of the gastro-intestinal tract of any type, fluid filled loops are of considerable significance and are just as important to recognize as the typical air filled or air and fluid filled loops. As mentioned above, a predominance of fluid filling suggests a vascular lesion of some type.

The dermoid cyst usually presents a specific appearance. There is a radiolucent ovoid or lobulated contour due to the fat content and there are associated calcifications. The erect film shows layering of the fatty material above and the fluid density material below.

Patients with sprue commonly present a challenge to both clinician and radiologist when they develop abdominal pain. They may develop considerable dis-

tention of the small bowel with gas and fluid without having any mechanical cause unless the ingestion of a somewhat larger than usual meal may be one of the precipitating factors. The bowel in sprue has a decreased propulsive power and many of these patients have apparently had enough of this type of change to get into trouble. Some of them have been subjected to several fruitless laparotomies.

Among the additional conditions which may cause bowel distention are pheochromocytoma, lead poisoning, hysteria, muscular dystrophy, and severe pain due to injury elsewhere in the body.

SUMMARY

1. The roentgen examination of the abdomen is of most value when other methods do not make a specific diagnosis possible.

2. On many occasions roentgen findings will make possible a specific diagnosis.

3. Frequently roentgen examination will offer supportive or confirmatory evidence for a clinical diagnosis.

4. As with many other examinations, abdominal films are of most value when studied after consultation on the clinical evidence.

Fig. 2a

Fig. 2b

Fig. 2a. Perforated duodenal ulcer in a 19 year old male. Note the fine sharp oblique band formed by the falciform ligament.

Fig. 2b. Enlargement of the right upper abdomen from 2a.

POLYOSTOTIC FIBROUS DYSPLASIA

(A CASE REPORT)

JOHN R. CALDWELL, M.D.*

In 1937, Albright et al, described a syndrome "Osteitis Fibrosa Disseminata with Areas of Cutaneous Pigmentation and Endocrine Dysfunction with Precocious Puberty in Females."[1] The tendency to use the name Polyostotic Fibrous Dysplasia, suggested by Lichtenstein,[2] has come into general use for the bone disease rather than Osteitis Fibrosa Disseminata.

The case here presented shows café au lait pigmentation and multiple sites of cystic or hyperostotic bone disease but no precocious menstruation and therefore might well be designated as in the title or as Albright's Syndrome sine Precocious Puberty.

The patient, D. S., case number 483894, a girl, was first admitted**, at age 11 in August of 1946 because of a limp on walking and a waddling gait. At birth she had areas of light tan pigmentation of the skin, otherwise was alright until age 6 when she fell from a bicycle and thereafter began to limp on walking. She had not yet started to menstruate when first seen here.

On examination the pigmentation was sharply demarcated from normal skin by irregular, jagged margins and was distributed over the left anterior hemithorax with its medial margins at the midsternal line. It was also present on the left arm and thorax and lumbar regions posteriorly. There was asymmetry of the face with a bony prominence lateral to the right eye and slight proptosis of the right eye. There was prominence of the trochanters bilaterally with restriction of abduction and rotation of the hips and some atrophy of the right thigh and leg. She had some axillary hair, but no pubic hair at this time. There was slight cardiac enlargement and a grade two, apical, systolic murmur, but otherwise the physical examination was normal.

X-rays showed multiple areas of bone thickening and increased density, especially along the base of the skull, the occiput, right orbit and elsewhere in a spotty, widespread distribution. Multiple cystic areas especially involved both ilia, both femora with a very definite coxa vara deformity on both sides and other areas of thinning of the cortex in the left femur, and an incomplete fracture through the neck of the left femur. X-rays of the teeth showed normal lamina dura and there was normal bone structure between the areas of disease and generally in areas not involved.

Laboratory studies summarized for determinations on numerous occasions were as follows: (expressed in milligrams percent)—serum calcium 9.7; 10.2; 9.0; 9.6. Serum phosphorous 2.29; 2.48; 4.3; 3.37. Alkaline phosphatase 10.8; 11.0; 7.6; 31.2. A BMR was zero. A calcium balance study done over an eight-

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**Referred by Dr. D. J. McColl, Port Huron, Michigan.

een day period revealed positive calcium balance. The average daily intake was 1.234 Gm., daily average fecal output was .913 Gm., and daily average urinary output was .042 Gm., giving a daily retention average of .279 Gm.

Histopathology of tissue removed from the femoral heads revealed a marrow completely replaced by cellular fibrous tissue. Bone trabeculae passed irregularly through this fibrous tissue. There were varying areas of osteoblastic and osteoclastic activity and in a few areas cartilage undergoing transformation into bone.

Three successive operations were performed for correction of the coxa vara deformity in 1947, 1948 and 1950, by the Department of Orthopedic Surgery. The final result was achieved after a procedure which involved curettement of the cystic bone lesions, replacement of the cavity with cancellous bone chips and insertion of a blade plate in the left femoral head and a Jewett nail plate with screw fixation in the right femora.

Photo of patient at age 11 showing asymetry of face with bony prominence lateral to right orbit.

Photo of café au lait pigmentation involving mainly left hemi-thorax—which has irregular margins so aptly described by Albright as resembling the "Coast of Maine".

In 1951 it was evident that she had a good functional result from the corrective surgery. She could climb stairs without support other than the railing and x-rays showed some callus formation around the bone at the site of the metal plate fixation.

She returned for a progress visit in January of 1954 and reported that she had attended school regularly and would graduate in June. She was getting along well at school. On careful systemic review, she had no complaints, she still had a waddling gait. Her menarche occurred at age 14, menses were regular—every

twenty-eight days with a normal flow lasting three to four days. Re-examination showed a rather short stature with pronounced facial deformity and definite evidences of progressive disease in that the bony prominence of the lateral margin of the right orbit was more pronounced and there were palpable bony enlargements of the occiput with prominent frontal bosses. There were palpable bony, smooth, nodular enlargements in both humeri and over several ribs and in both tibial regions. The coxa vara was evident as before with a genu valgum more marked on the right.

Comparison x-ray films of the skull and pelvis showed evidence of progression of the disease with increased hyperostosis and cystic degeneration in the skull and pelvis.

*DISCUSSION**

Both hyperostotic and hypöostotic bone disease with normal bone structure intervening serve to distinguish this syndrome from hyperparathyroidism with bone disease. In hyperparathyroidism, hyperostotic bone lesions are most unusual and the bone disease, when present, is generalized involving a total skeletal demineralization rather than spotty disease with uninvolved normal bone structure present.[3]

The cutaneous pigmentation in this case and segmental distribution of bone lesions involved in other cases suggest neurologic or embryologic relationships in polyostotic fibrous dysplasia. There is no such segmental pattern nor cutaneous pigmentation in hyperparathyroidism but this and precocious puberty in females are not sufficiently constant to constitute important differentials in diagnosis. The final main point in differential is the blood chemistry. The serum calcium and phosphorous levels are normal in this disease as compared to a high serum calcium and low serum phosphorous level in hyperparathyroidism. Both diseases may have a high serum alkaline phosphatase as this case shows. It will also be noted that this patient has no systemic symptoms such as those due to hypercalcemia in hyperparathyroidism, namely, muscular weakness, hypotonia, anorexia, nausea and vomiting and constipation, nor did she have evidences of hypercalciuria, hyperphosphaturia or of renal disease, which is present in over one-half of the cases of hyperparathyroidism.

Neurofibromatosis is distinguished from this disease by the fact that usually there are only a few scattered bony cystic lesions in neurofibromatosis. The cutaneous pigmentation has smooth margins like the "Coast of California" rather than the jagged margins in this case, where it resembles the "Coast of Maine" as described by Albright. The presence of multiple cutaneous fibromatous nodules and a family history of the same disorder in neurofibromatosis is in contradistinction to Albright's Syndrome.[4] Occasionally, one may have difficulty with mild cases in distinguishing lipoid granulomatoses, solitary bone cysts, multiple myeloma, metastatic malignancy, etc., from this disease but knowledge of this syndrome and careful diagnostic study will usually differentiate these diseases.

The only known treatment is orthopedic therapy for the skeletal deformities and fractures.

*The discussion of differential diagnosis given here is mainly taken from the book (reference four) by Albright and Reifenstein with permission of the authors.

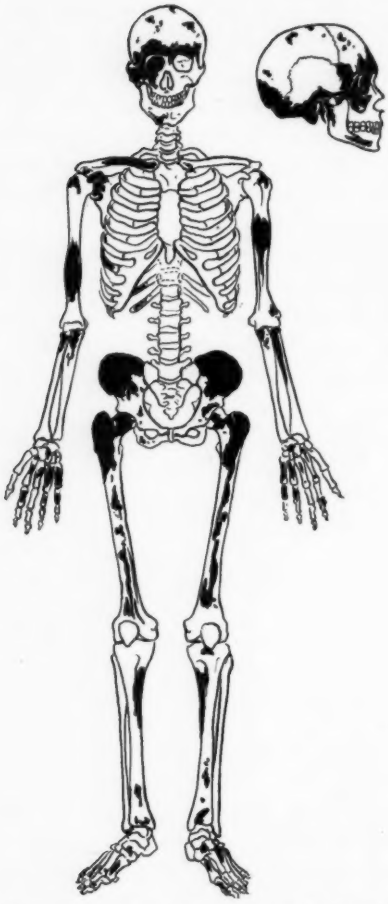

Diagram showing localization of the bone disease in this case.

Skull x-ray showing hyperostotic bone lesions involving right orbital region with obliteration of the frontal and right maxillary sinuses.

Pelvis x-ray shows cystic changes in ilia and femora and hypöostotic bone lesions. These are early changes of the "shepherds crook" deformity of femora. Normal bone structure in pubis and ischium on the left.

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MISUSE OF WORDS

EUGENE J. ALEXANDER, M.D.*

Psychiatrists are alert for slips of the tongue because these may be indications of repression or suppression of ideas with dynamic significance. But even individuals of good education and intelligence may use words incorrectly, just as they may misspell words, or add a column of figures incorrectly, without it being evidence of the unconscious at work. Here are some examples I have collected recently, with suggested reasons for the errors.

Meeting the word in written form, he takes it into his vocabulary with an incorrect mental spelling, leading to incorrect pronunciation:

a. "I had a proached egg for breakfast."

b. "I was noncahalant about it." (as if the word were non-ca-hal'ant)

c. "The reason I am shriking my work is because I feel so bad." She meant "shirking," of course. The error may also have come about from confusion with the word "striking" as applied to labor's absences from work. I am quite sure she did not know the meaning and connotation of the noun "shrike," for practically no one did until the play by that name was produced recently.

d. ". . . a griping tale on television." The context indicated he meant a "gripping" tale. I am sure he was acquainted with the word "gripe," both in its medical sense of intestinal cramps, and in its slang sense of annoying. He was not being careless, for he used the word twice. The dictionary gives him some support in his usage of the word, but to his listeners the colloquial meaning came first to mind, and he sounded as if he were trying to make a joke—which he wasn't.

e. "I have a bussing in my ear." I doubt if he knew of the meaning "a kiss" for the word "buss."

Meeting the word in written form, he takes it into his vocabulary with an incorrect meaning, gained from its context.

a. The word "exotic" has been used so much with a connotation of exciting, alluring, and mysterious that its dictionary meaning ("foreign") comes as a surprise to most persons who think they know the word. That, of course, is how language changes; if general usage differs from dictionary definition, it is the dictionary, not usage, which must change.

Hearing the word, he takes it into his vocabulary with an incorrect meaning, because the word happens to sound like one he already knows. This type of error in the use of symbols is often met in psychiatric practice: the patient behaves as if things which have a superficial similarity are the same thing.

a. "My interests are vicarious." (meaning, various)

b. "I have exalted all the funds I have." (meaning, exhausted)

c. "I was reticent to see a psychiatrist." I have heard several different persons, including a radio announcer, misuse this word, as if it meant "reluctant" or "hesitant." I think its similarity in sound and slight similarity in meaning (i.e., reticent means a specific reluctancy or hesitancy to speak) accounts for its misuse.

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d. "He bolstered out of the house." This was used in a context meaning that he left angrily and noisily, as if she had combined the two words "bolted," and "blustered."

e. Errors of the type I am now describing may make excellent humor. "The Pocket Book of Boners," one of the funniest books I have ever read, contains many like these: "When the villain tried to seduce her, she reclined to obey him." "It was raining cats and dogs, and there were poodles on the ground."

Hearing the word, he continues to leave the word out of his vocabulary, but gives its meaning to a word he already knows which has a similar sound but a different meaning:

a. "I contributed my indigestion to the shrimps I ate." (meaning, attributed)

It also appears that some words get misused because the error trips more easily and rhythmically off the tongue than does the correct phrase:

a. "I ate my dinner with great agusto." One must admit this has more rhythm than "great gusto."

b. "I should have stood in bed." This use of "stood" for "stayed" was mimicked so much, as a joke, after the famous first time it was uttered, that it is becoming a part of common usage now, of which the dictionaries will eventually have to take note. My patient, who intended to convey to me the idea that he was staying on his diet, would not, in the present tense, have said, "I *stand by* my diet," for there was no defense of or "standing up for" the diet implied. However, in the past tense, he has forgotten how to say, "I *stayed on* my diet," and it would sound funny to him to say, "I *stood on* my diet." Therefore, the phrase as he actually spoke it was, "Still I *stood by* my diet."

I have called attention to these common errors in the use of language symbols primarily to emphasize that not all errors humans make are dynamically determined. Some, of course, are. But inattention (proached for poached), connotation (exotic for exciting), and the rule "similar things are the same thing" (vicarious for various) accounts for some errors. Perhaps the point is not proved. One could say, for example, that proached has more specific dynamic meaning than mere inattention. Perhaps the man always wanted to be a preacher, and so every time he sees "p" followed by "ch" the unconscious makes an effort to turn it into "preach," and almost succeeded with his eggs for breakfast. Now, every time he eats them—if they are proached, but not if they were poached—he can satisfy symbolically a tiny bit of his wish to be a preacher. Such neat analyses make us very proud of ourselves as psychiatrists, but also very close to being dealers in idle speculation instead of physicians. No, the mental process is simpler than that. Some people just are not as precise as others in their use of words. Some persons have an interest in words; others, poor souls, do not. I read all the signs along the road; my wife sees all the flowers. Why am I so blind as to think a petunia and a nasturtium look alike, and she so blind that she reads, "I am not rich," as, "I am now rich?" Analyze the reasons for our different interests to your heart's content and I'll not argue with you; but when I call a chrysanthemum a gardenia, just call it ignorance, and not evidence of a repressed destructive wish toward mums, mummy, mammy, mommy, and mother.

HYPERTHYROIDISM, TWO CASES DEMONSTRATING ITS INCEPTION DURING CORTISONE AND THYROID THERAPY

RAYMOND C. MELLINGER, M.D.* and RICHMOND W. SMITH, JR., M.D.**

In the past few years, considerable attention has been directed to adrenal-thyroid-pituitary relationships. The development of radioactive iodine tracer techniques for study of thyroid function, and the availability of cortisone and purified thyroid-stimulating hormone have made possible new approaches to the intricate interplay of these several endocrine systems. As a result, thyroid hormone and, to a lesser extent, cortisone have been shown to inhibit the function of the thyroid gland. Periodically, interesting cases come under study which may fail to support the new concepts derived from planned experimentation. The two cases which are reported here suggest that concepts of pituitary-thyroid and adrenal-thyroid relationships are not to be oversimplified, particularly in disease.

CASE REPORTS

Case No. 429413, Mrs. A. S. is a 47-year-old white woman who was first treated in the Henry Ford Hospital in 1944. At that time she was a patient of the Gastroenterology Division with a diagnosis of functional bowel distress. She was then taking 60 mg. of thyroid daily which had been prescribed elsewhere for complaints of fatigue, menstrual irregularity, and dizzy spells. She stated that she "felt awful" if thyroid were omitted.

The patient continued her treatment elsewhere. The amount of thyroid was gradually increased to a maximum of 240 mg. daily, which dose the patient began in the fall of 1952. She felt well, but during the following winter noted a much greater tolerance for cold weather and a gradually increasing appetite. On April 11, 1953 the patient was attending Good Friday services when she was suddenly seized with a terrifying episode of paroxysmal tachycardia. She consulted a cardiologist who, after controlling the attack, advised a program of 6-propylthiouracil and iodine therapy. There was noticeable improvement within a week. The patient regained eight pounds of weight she had lost, but she continued to be extremely nervous and apprehensive. She discontinued her medications and came to the Endocrinology Division in May, 1953.

At no time did the patient notice unusual weakness. Nervousness, palpitations, and excessive sweating were her chief complaints. She was of normal weight and there was no sign of muscle wasting. The skin was soft, warm and moist. The blood pressure was 150/75 and the pulse varied from 132 to 160 per minute. There was no exophthalmos, but stare and lid-lag were present. The thyroid gland, diffusely enlarged to twice normal size, was firm and symmetrical. The heart was not enlarged. Besides the sinus tachycardia, an apical systolic murmur

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and a prominent third heart sound were noted. The lungs were clear and there was a trace of ankle edema. The BMR was +39 on May 14, 1953.

It was felt unlikely that the hyperthyroidism was a response to exogenous thyroid, since it had persisted a full month after discontinuing the hormone. Accordingly, the patient was given Tapazole in divided doses, totalling 25 mg. daily. Rapid clinical improvement followed and the dose was reduced to 15 mg. daily on July 20. By September, however, there was clinical evidence that the patient had relapsed, and the BMR was +35. This confirmed the fact that the patient had indeed developed hyperthyroidism with diffuse goiter while receiving 240 mg. of desiccated thyroid daily. The dosage of Tapazole was increased and the patient continues to respond satisfactorily to this treatment.

Case No. 446109, Miss M. M. is a 24-year-old white telephone operator who has had progressive rheumatoid arthritis since the age of fourteen. She was originally studied in the Henry Ford Hospital in 1944, at which time there was no palpable abnormality of the thyroid gland and the BMR was +12. The remainder of the findings were compatible with the diagnosis of active rheumatoid arthritis.

Despite varying therapies, there was a steadily progressive increase in joint involvement and disability. In December 1951, the patient was given cortisone therapy for about one month with considerable symptomatic improvement. This was resumed in the spring of 1952 and continued for an eight-month period when it was interrupted for a trial of Butazolidin therapy. Cortisone was once more resumed in January 1953, and the patient continued to take 62.5 mg. daily in divided doses until her re-admission to the hospital in October of that year. The cortisone treatment was supplemented with aspirin and oral potassium chloride.

In late summer 1953, the patient experienced an acute exacerbation of her arthritis during a period of extremely hot weather. The joint distress was accompanied by a persistent tachycardia, anorexia, weight loss of twenty-five pounds, sweating, and diarrhea three or four times daily. A BMR in June 1953, prior to this flare-up, was reported to be normal.

When admitted to the hospital, she showed considerable progression of her arthritis. There was evidence of weight loss, but specific muscle wasting could not be evaluated. The skin was warm and moist but the hair was not of unusual texture. There was a slight widening of the palpebral fissures, but no lid-lag or exophthalmos. The right lobe and isthmus of the thyroid gland were very firm and diffusely enlarged to two or three times normal size. The left lobe appeared not to be involved. The gland was easily movable and was not tender. There was a definite but irregular tremor of the hands and a persistent tachycardia, with a pulse of 140. The blood pressure was 130/50. There was no cardiac enlargement, and a grade III apical systolic murmur was present.

The hemoglobin was down to 8.5 gm. per 100 c.c. of blood. There were 9700 white blood cells per cu. ML. with 27 per cent lymphocytes. The direct eosinophil count was 173. Serum electrolytes were normal. The cholesterol was 148 mg. per cent. Cephalin-cholesterol and thymol flocculations were four-plus with

twelve units of thymol turbidity. The bromsulphalein test was negative in sixty minutes and the sedimentation rate was 41 mm. The BMR was +55. Radioactive iodine uptake was 80 per cent in twenty-four hours, and the contact counts were uniformly elevated over the entire thyroid gland.

The patient was placed on Tapazole therapy, twenty-five milligrams in divided doses daily, while she continued to take the same dose of cortisone and aspirin. By December 21, 1953, she felt much improved. She no longer had palpitations or excessive sweating, and the diarrhea had subsided. She had gained six pounds and the joint distress was much improved. The pulse rate was down to sixty-four, and the blood pressure was 122/64. The thyroid gland seemed to be somewhat smaller than it had been on her admission to the hospital. The patient has continued to improve, and has now gained fifteen pounds since the beginning of Tapazole therapy. She has no symptoms of hyperthyroidism.

DISCUSSION:

The etiology of hyperthyroidism with diffuse goiter is unknown. The observation that hypopituitarism produces hypothyroidism, and that pituitary thyroid-stimulating hormone (TSH) is capable of increasing thyroid size and rate of thyroid hormone secretion has led, naturally, to the assumption that diffuse goiter with hyperthyroidism is really a form of hyperpituitarism with increased TSH elaboration. The occasional association of the disease with acromegaly is some support for this idea. In Graves' disease, the presence of exophthalmos, which is believed by many to be caused by a pituitary principle, also suggests that pituitary hyperfunction is the cause of the hyperthyroidism. However, attempts to demonstrate abnormal amounts of assayable TSH in serum of patients with hyperthyroidism have not yielded uniform results (1). This does not indicate, necessarily, an absence of pituitary hyperfunction, since the hyperplastic thyroid could utilize the circulating TSH so completely that the demonstration of increased hormone titers in the blood would be impossible.

Exogenous thyroid hormone is a potent inhibitor of thyroid function. Greer (2) has shown that 180 mg. of desiccated thyroid by mouth will reduce the radioactive iodine uptake of the normal thyroid to myxedematous levels within one week. That this effect is due to TSH inhibition is confirmed in the demonstration by Perlmutter (3) that the inhibited gland will respond to even small amounts of TSH. If diffuse goiter with hyperthyroidism is due to excessive TSH elaboration, the normal pituitary-thyroid relationship obviously must be disrupted. Otherwise, the increased amounts of thyroxin would rapidly inhibit the pituitary hyperfunction and cure the disease.

Werner (4) has demonstrated that in untreated Graves' disease, the administration of desiccated thyroid does not significantly reduce the elevated I-131 uptake by the gland. Furthermore, administering TSH to these patients produced a further increase in the serum hormonal iodine. After remission was produced by radioactive iodine, the glands responded almost normally to these hormones; that is, thyroid administration reduced the I-131 uptake, and TSH injection markedly increased the serum protein-bound iodine. The above author

feels that if Graves' disease were due to primary TSH excess, thyroid ingestion would reduce the I-131 uptake of the untreated gland, but the gland would not react to additional amounts of TSH. Since these results were not obtained, he concluded that the pituitary is not primarily involved in Graves' disease. However, these observations are also compatible with the thesis that the hyperactive pituitary gland is the cause of the disordered thyroid function, but that the pituitary has achieved an autonomy of function, free of the normal checks and balances. It can be further postulated that the hyperplastic thyroid gland is not operating at its maximal capacity to respond to TSH, and increases its hormone output still more when an additional stimulus is applied. The apparent recovery of pituitary responsiveness to the inhibiting influence of thyroxin after I-131 therapy of Graves' disease is difficult to explain, however, unless I-131 has a direct pituitary effect. Whatever the explanation of his findings, inspection of Werner's data indicates that the differences between treated and untreated hyperthyroid patients are only those of degree.

Several studies have shown that cortisone is also an inhibitor of the function of the normal thyroid gland, but a less effective one than is thyroxin. Prolonged administration of the hormone has lowered the serum protein-bound iodine and decreased the I-131 uptake by the thyroid gland of normal individuals (5, 6). It has been suggested that the reduced I-131 uptake after cortisone therapy might be secondary to an increased renal clearance of plasma iodide, making the administered isotope unavailable to the gland, rather than being a result of primary impairment of thyroid function. However, simultaneous determinations of renal and thyroidal clearances of plasma I-131 by Berson and Yalow (7) have shown that both effects occur independently. The cortisone-inhibited thyroid gland will increase its I-131 uptake in response to TSH administration (8) just as the thyroxin-inhibited gland will do. It is assumed, therefore, that the mechanism by which cortisone reduces thyroid function involves the pituitary, with an inhibition of TSH secretion.

In view of these observations, it would appear unlikely for diffuse goiter with hyperthyroidism to appear in patients receiving thyroid or cortisone in therapeutic doses. However, the two cases reported demonstrate this occurrence. The first case developed hyperthyroidism while taking a dose of desiccated thyroid sufficient to inhibit the function of a normal gland completely. That this could cocur is evidence that the hyperfunctioning gland has escaped from its normal controls. Whether this disease represents a primary autonomous overfunctioning of the thyroid or is a disorder of the hypothalamus and pituitary which renders them unresponsive to circulating thyroid hormone remains unknown. Nevertheless, the case demonstrates that the use of desiccated thyroid did not prevent the development of the disease. It is suggested that the use of desiccated thyroid as a pituitary inhibitor in cases of hyperthyroidism with "pituitarigenic" exophthalmos would not be likely to succeed.

The second patient developed hyperthyroidism after taking cortisone for about eighteen months. The goiter was somewhat unusual in that the left lobe did not appear to be enlarged, although the radioactive iodine tracer indicated that the

entire gland was hyperfunctioning. This case demonstrates that cortisone is not a sufficiently potent inhibitor of thyroid function to prevent the development of marked hyperthyroidism. It is likely that the effects of both cortisone and thyroxin in the hyperthyroid patient are different from those observed in normal patients, owing to alterations in pituitary-thyroid-adrenal relationships inherent in the disease state. Since these hormones seem to affect thyroid function by inhibiting TSH elaboration, they would be expected to exert a greater influence in hyperthyroidism secondary to pituitary activity than in a primary thyroid disease such as hyperfunctioning adenoma. The unquestioned beneficial effects of adrenal steroids which we have observed in several patients in thyroid crisis are probably not due to a reduction of thyroid function, but reflect improved resources for the patient to meet the severe stress.

SUMMARY

Two cases of hyperthyroidism with diffuse goiter are reported. One patient developed her disease while taking 240 mg. of desiccated thyroid daily, and the other, a patient with rheumatoid arthritis, became hyperthyroid while receiving 62.5 mg. of cortisone daily. Since both cortisone and thyroxin have been shown to inhibit TSH elaboration and thyroid function in normal subjects, such cases would appear to be unexpected. Their occurrence implies a derangement of pituitary-thyroid-adrenal relationships in hyperthyroidism which cannot be elucidated by the study of normal subjects alone.

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AN APPLIANCE FOR THE NON-OPERATIVE RELIEF OF PARALYTIC FOOT DROP

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Numerous appliances have been designed for the non-operative relief of paralytic foot drop. There are several groups of patients with foot drop on whom operative corrections cannot be done. First, there are those with foot drop due to peripheral neuritis in whom there is a possibility of recovery under medical measures. In these patients it is advisable to relieve the foot drop by conservative means for the comfort of the patient and to prevent contracture of the tendo Achilles until it is determined whether there will be a subsidence of the neuritis. Second, conservative measures must be employed for those patients who refuse operation or whose general condition makes operation inadvisable, and who have foot drop due to flaccid paralysis of the anterior elevator muscles of the foot from traumatic injury of the muscles or their nerve supply, intractable peripheral neuritis, or anterior poliomyelitis.

The present appliance is designed for use in such cases of foot drop due to flaccid paralysis of the dorsiflexor muscles of the foot. It has certain advantages in that it can be made readily and inexpensively by any shoemaker, it is light and comfortable, the patient's regular shoes are used without defacing alterations, it leaves the unaffected portion of the limb free from braces or straps, it permits the patient to walk with an almost normal amount of plantar flexion of the foot, and it is relatively unnoticeable on patients wearing long trousers. This appliance has been found to give good results in such cases as those described above. For satisfactory results it is necessary that the flaccid paralysis be limited to the foot, and that the neighboring weight-bearing joints be in a condition to cooperate, i.e., the hip and knee.

The appliance consists of a leather cuff four inches wide which fits about the ankle just above the malleoli. The cuff closes on the side with a single shoe lace which is tied through an eyehole at the bottom to prevent its loss, and then laces over hooks placed along both ends of the cuff. Hooks are used for facility in lacing the cuff, and one row is placed several inches in from the end of the cuff, thus making a tongue to protect the leg from the lace (Figure 1). Anteriorly the cuff has a half-moon notch at the inferior border to prevent binding where it lies over the tibialis anticus and anterior flexor tendons. Also anteriorly the cuff is reenforced by a narrow strip of leather sewn across the narrow width of the cuff. Through this reenforcement near the distal side of the cuff are placed two hooks, one above the other, with the hooks turned proximally. These hooks are of the standard type used in lacing shoes. The cuff can be padded with felt if so desired, but when used over heavy socks or stockings it is sufficiently comfortable without. The cuff is illustrated in Figure 1.

A hook with the hook turned distally is fastened to the shoe at the point best

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suited to give adequate correction of the foot drop in the given case. Usually the most satisfactory point is approximately over the distal head of the fourth metatarsal bone. A short, light spring is attached between the anterior hook on the cuff and the hook on the shoe. Two hooks on the cuff permit greater adjustment of the spring which should be under sufficient tension to just correct the foot drop against gravity, but not enough to put undue pressure on the ankle. This appliance in use is illustrated in Figures 2 and 3.

This appliance permits the patient to walk with a slight "spring" in his foot and ankle, and he can plantar flex his foot at will if these muscles are intact. Illustrated in Figures 2 and 3 is the relative position of the uncorrected foot to the foot with the appliance applied in a case of bilateral foot drop. By using the patient's regular shoes which are not disfigured it is possible to have several pairs available, to use house shoes as well as street shoes so that the foot drop can be corrected constantly, and to permit the use of the same kinds of shoes the patient would ordinarily wear. Best results are obtained when light shoes are used as this requires less pull on the spring and hence less pressure from the cuff about the leg above the ankle to correct the foot drop.

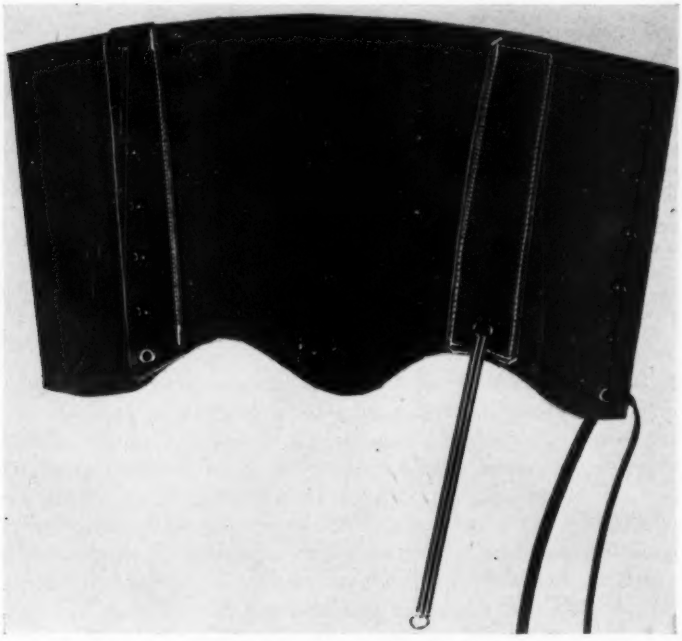

Fig. 1. The leather cuff which fits about the ankle, with spring.

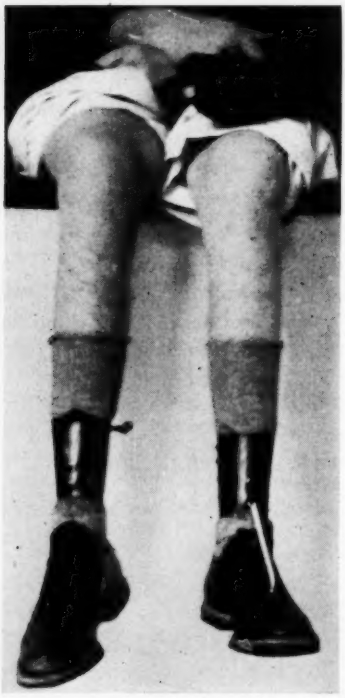

Fig. 2. The appliance in use, showing the uncorrected foot drop of the right foot and the corrected foot drop of the left foot in a case of bilateral foot drop. Note the position of the spring between the cuff and the shoe.

Fig. 3. The appliance in use, showing the uncorrected foot drop of the right foot and corrected foot drop of the left foot in a case of bilateral foot drop. Note the position of the spring between the cuff and the shoe.

CERTAIN FUNDAMENTALS OF PRESSURE RECORDING

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During cardiac catheterization, the registration of intracardiac pressure changes has become routine. In this procedure one uses a pressure pick-up outside the body to which is attached a long narrow bore cardiac catheter which has been introduced into the heart by venous catheterization. The intracardiac pressure changes are transmitted through the water column of the catheter to the pressure pick-up where motion is imparted to its diaphragm. This mechanical motion is sensed, usually by electrical means, and then appropriately recorded. An important consideration is one's confidence in the whole system used to do the job with reasonable accuracy. This involves determining the frequency response characteristics of the system. The purpose of this paper is to re-emphasize a useful method of doing this and to set down in a simplified fashion the steps and equations involved.

METHOD:

There are two main methods of evaluating the response characteristics of the over-all system. One is to force the system by impressing a sine wave of variable frequency but constant amplitude and record the response directly. The other method is to excite the system with a square-wave pressure change. The latter will be used here because of its simplicity. This method consists of impressing or releasing instantaneously a positive or negative pressure. The catheter tip may be sealed in a glass tube filled with water on the end of which a distended balloon is burst while a trace is being made. Or more simply, a negative pressure may be suddenly created and released by pulling the plunger quickly from a syringe whose end is occluded by the catheter tip. When this is done, one will obtain transients such as those seen in Figure 1. The analysis of such oscillations will define the frequency response characteristics of the system under test. It should be noted here, that the over all response of the system is equal to the product of the responses of the individual components.

We should digress at this point, briefly, so as to explain why such oscillations occur. If one were to suspend a mass by a spring, the mass would extend the spring and finally come to rest at a position of equilibrium. The further application of force to the mass m, so as to cause greater tension on the spring, would produce a displacement of the mass directly proportional to the force applied and inversely proportional to the spring stiffness k. Upon the release of this increment of force, the spring tension would cause the mass to accelerate toward its original point of equilibrium. However, the mass would not come to rest there, but would overshoot to the opposite side of equilibrium thus compressing the spring proportional to the instantaneous velocity of the mass as it passed the equilibrium point. The compressed spring force would then cause motion in the opposite direction in a similar fashion. In the absence of friction, this oscillatory

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motion would go on ad infinitum. The repetition of this motion from any given point or between successive peaks to the same side will occur at definite intervals of time referred to as the "period of vibration"—T. The periods per unit time, usually seconds, is the "frequency"—F. The above relationships may be expressed by the equation:[1]

$$F = \frac{1}{T} = \frac{1}{2\pi}\sqrt{\frac{k}{m}}$$

Such a repetitious motion is termed periodic. This is an example of simple harmonic motion, because the acceleration of the mass is always proportional to the displacement.

The original amplitude of vibration in periodic transients (Figure 1, h = 0.15 and h = 0.64) decrease by geometric progression. This is due to the presence of

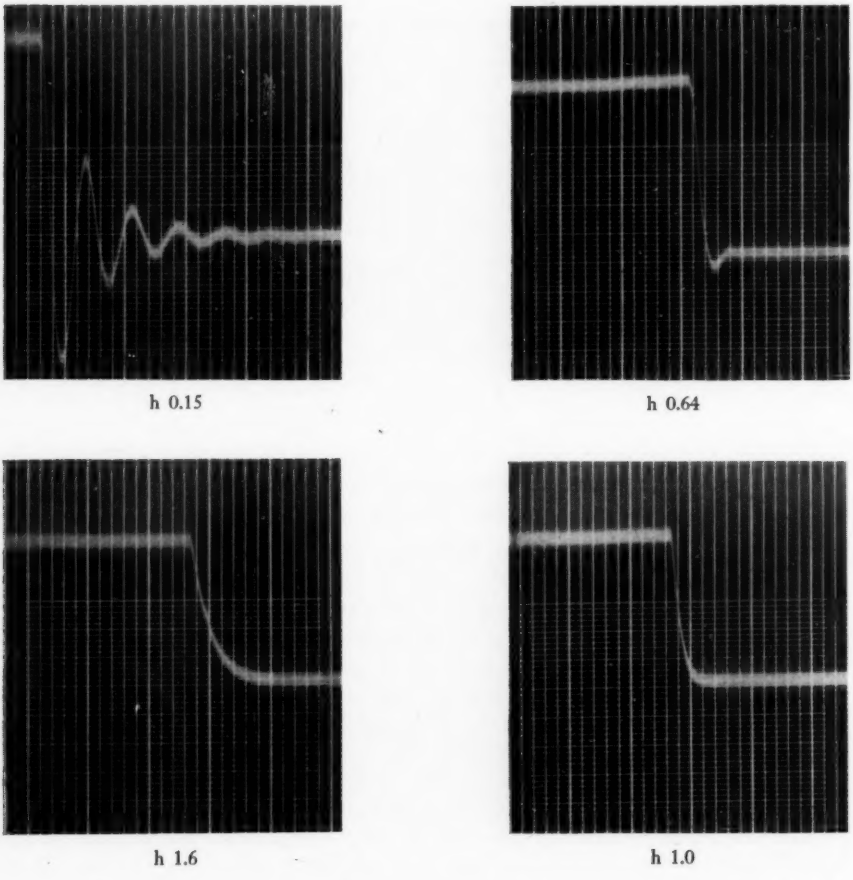

Fig. 1—Typical square-wave response transients with various degrees of damping.

friction which is proportional to the instantaneous velocity and is termed "viscous damping"—c. If the damping present is great enough, it may entirely prevent any overshoot in which case the motion becomes aperiodic (Figure 1, h = 1.0 and h = 1.6) and the displaced mass will no longer oscillate. The influence of damping on the frequency may be shown by the equation:[1]

$$F = \frac{1}{2\pi}\sqrt{\frac{k}{m} - \left(\frac{c}{2m}\right)^2}$$

The system is critically damped when sufficient friction is present so as to cause the mass to return to the equilibrium position in the shortest possible time without any overshoot. This value of c is known as the "critical damping constant"—c_c.

In order to facilitate the comparison of various degrees of damping in different systems the "per unit damping" or "coefficient of viscous damping"—h is used and may be defined as:[4]

$$h = c/c_c$$

When the damping is less than critical, the damping coefficient will be a decimal fraction. In critically damped and overdamped systems, the damping coefficient will be 1 or greater than 1 respectively—Figure 1.

Regarding testing systems with a square-wave pressure, any transient thus determined experimentally must perforce be influenced by friction or damping. This frequency will be designated F_d and the period T_d. If one were to calculate the frequency with which a system would oscillate in the absence of friction, one would find the rate was greater. This frequency will be designated F_o and the period T_o. If the system is forced with a sinusoidal input of variable frequency, there would be a gradual increase in amplitude to a peak, provided the damping present was not too great, and then a rapid decline—Figure 2. This peak is called a "resonant peak" and its frequency will be designated F_r. Theoretically, in a system where there is no friction: $F_o = F_d = F_r$. However, in practice, damping is always present and $F_o > F_d > F_r$.[1]

The concept of F_o was introduced in order to facilitate the comparison of basic response characteristics in different pressure systems. This is a constant frequency point for any given system regardless of the amount of damping present and is determined solely by inherent physical characteristics. In the spring system just described, it would be determined by the relative values of m and k. In carrying our analogy over to the catheter system, we may ignore the recorder for practical purposes and simply discuss at this point the catheter and pressure pick-up. Mass would be analogous to the quantity of water moved in the catheter, connecting tubing, and manometer. As damping is also considered, mass is referred to as "effective mass" as this includes the effects of tubing bore variations as well as the actual quantity of fluid contained. This is easily seen by the common observation that there is more resistance to the flow of liquid through a narrow than a wide bore tube. Spring stiffness would be analogous to the rigidity of the manometer diaphragm and the walls of the connecting tubing and catheter. This analogy to k is termed the "volume elasticity coefficient" and is expressed as the ratio of pressure applied to volume of fluid displaced.[7] As these quantities are

difficult to calculate, response characteristics are best determined experimentally after the method below or by some other equally convenient method.

Referring again to the importance of F_o, any absolute frequency F may be expressed as a ratio of F_o, termed the "relative frequency"—F/F_o. The amplitude of response at any given frequency may be expressed as a ratio of the static re-

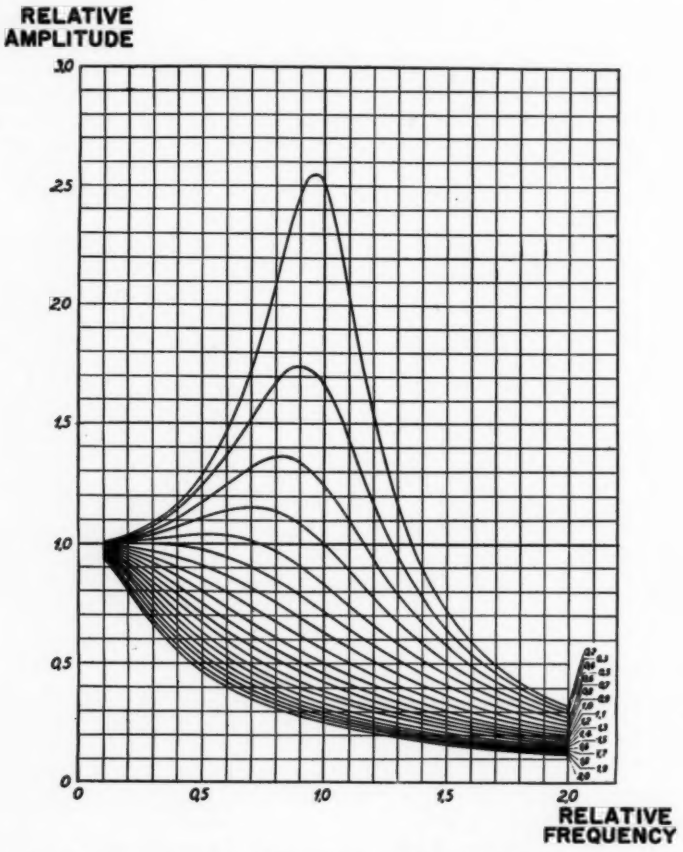

Fig. 2—Amplitude-frequency curves with different degrees of damping from 0.2 to 2.0 (the figures at the right-hand ends of the curves).

sponse, termed the "relative amplitude"—amplitude at F/static amplitude. If one plots relative frequency along the abscissa and relative amplitude on the ordinate, a family of curves can be drawn which apply to all manometer systems and represent a standard of comparison[2]—Figure 2. These curves are of use after one has determined the response characteristics of the system as outlined below.

In Figure 3 is shown a transient oscillation. The following steps are followed in defining the characteristics of such a system:[2,5]

(1) Measure T_d (the time in seconds between any two successive peaks to the same side of the equilibrium position).

(2) $F_d = 1/T_d$

(3) The coefficient of viscous damping h is then found thus:

(a) First find the "damping ratio"—X (the ratio of the amplitudes of any two successive deflections to the same side of the equilibrium line).

$$X = A_1/A_2$$

(b) The natural or Naperian logarithm (base e) of this ratio is called the "logarithmic decrement"—D.

$$D = \log_e X$$

(c) Knowing the logarithmic decrement, the damping coefficient is then found using the equation:

$$h = \frac{D}{\sqrt{4\pi^2 + D^2}}$$

(4) Having found F_d and h one may then calculate F_o with the formula:

$$F_o = \frac{F_d}{\sqrt{1 - h^2}}$$

(5) F_r is then found, if desired, with the equation:

$$F_r = F_o \sqrt{1 - 2h^2}$$

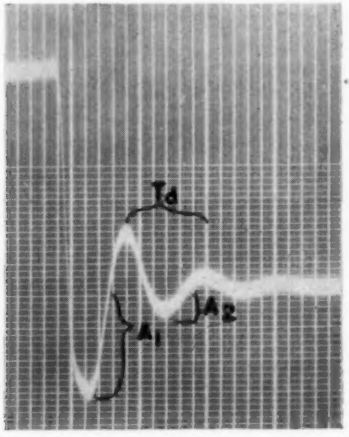

Fig. 3—A transient oscillation created by a square-wave impact in which T_d refers to the "period of vibration." A_1 and A_2 refer to the amplitudes of successive deflections to the same side of the equilibrium line.

Note that the relative amplitude at any given frequency may be easily estimated if F is expressed as the ratio F/F_o and if the damping of the system has been determined—Figure 2. The above method is not applicable to critically damped or overdamped systems as here the transient response to a square-wave impact is aperiodic. A method by Warburg[3] for determining the response characteristics of such systems is given in the bibliography.

The foregoing computations are somewhat time consuming when determining the degree of damping. It is usually sufficient, after doing a square-wave response test, to estimate the damping by the following method. X being the ratio of successive deflection to the same side of the equilibrium line, $\sqrt{X}$ is equal to the ratio of successive deflection to the opposite side of the line. The deflection to the opposite side of the line may be termed overshoot and as such is conveniently expressed as a percentage of the distance between the beginning of a free vibration and the equilibrium position—$100/\sqrt{X}$. The percent of overshoot at various degrees of damping is given in Table 1.

TABLE 1

h	"Overshoot" in %
0.1	73
0.2	53
0.3	37
0.4	25
0.5	16
0.6	9.5
0.7	4.6
0.8	1.5
0.9	0.15

The "overshoot" in percent at various degrees of damping in periodic systems.

DISCUSSION:

A pressure curve may be termed a periodic motion because usually it repeats itself in certain determined intervals of time. Fourier has demonstrated that any periodic motion may be considered to be made up of a series of sine waves. These waves consisting of the basic pulse frequency and certain harmonic frequencies. These harmonic frequencies, or sine waves, are multiples of the basic pulse frequency but differ in amplitude and phase. The desired pulse consists of the algebraic summation of the basic and harmonic frequencies. In order to faithfully reproduce the pulse, one's system must accurately record all frequencies from zero cycles per second to the highest harmonic frequency making up the pulse contour. Hansen[7] and Wiggers[8] have stated respectively that the response must be flat from zero to the 6th and 10th harmonic respectively. That is, the frequency response curve must be flat from zero to 12 or 20 c.p.s. respectively with a basic pulse frequency of 120/minute. Ellis[9] has shown that little alteration in contour occurs with a system flat to only 5 c.p.s. and with a 32% response at 60 c.p.s.

Something should be said at this point concerning the amount of damping desired. Because of the large mass in catheter systems they are very limited in the frequency response attainable, and the F_o of the system usually does not greatly exceed the frequencies to be measured. Damping is therefore introduced to in-

crease the usable frequency range. Experience has shown that a damping coefficient of 0.64 is desirable as this allows a uniform response within ± 2% out to 67% of the F_o.[6] Where no resonance is allowed, a damping coefficient of 0.707 is used as the response is flat within very close limits but to only 40% of the F_o. In catheter systems, the greater values of damping are desirable so as to minimize the artifact due to higher frequency oscillations. Generally speaking, a damping coefficient of 0.6 to 0.7 should be sought. The phase shift is then relatively linear; more so than either side of these values. Linearity of phase shift is desirable for there is then no distortion due to unequal relative shifts of different frequency components. There is a time delay in recorded signals, but this is slight and of no practical consequence. In the future, when practical intracardiac manometers are available which have values of F_o, at least five times greater than the highest frequency to be recorded, then values of $h < 0.3$ will be desirable. This is true because, with frequencies less than 20% of the F_o, the response is flat regardless of the lack of damping, and in this range there has been demonstrated negligible phase shift.[4] The question of phase shift has not been discussed in detail because of its relative unimportance with present day methods of intracardiac pressure recording. The presence of this factor in altering pulse contours is greatly overshadowed by the rather constant presence of artifact. This artifact is produced by the constant motion of the catheter in the heart with its accompanying accelerations and decelerations of the fluid mass in the catheter. This motion in effect creates a series of quasi square-wave impacts and thereby continually sets the system in oscillation. The frequency of these oscillations tend to vary directly with the F_o of the system and inversely with the h of the system.

From the foregoing discussion it should be apparent that one's aim should be to approximate the parameters of the desired system. However, it is of greater importance to know what one's pressure recording system is capable of when in actual use, regardless of the criteria or aims of response which may have been sought.

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Fig. 2 and Table 1

Hanson, A. Tybjaerg, and Warburg, E.: The theory for elastic liquid-containing membrane manometers, General Part. Acta Physiologica Scandinavica. 19:306, 1950.

SERIOUS HYPOTENSION FOLLOWING SEAFOOD INGESTION

JOHN H. BURGER, M.D.,* K. CHARLES WRIGHT, M.D.,**
JOSEPH H. SHAFFER, M.D.***

Serious hypotension has been reported in allergic states such as serum sickness, reactions to parenteral injection of foreign material for diagnostic or therapeutic purposes and hypersensitivity to ingested foods.(1) The latter is a rare clinical entity which has seldom been observed and is not well documented in the literature. The purpose of this paper is to present a case of serious hypotension which the authors believe to be an allergic reaction to ingested shrimp.

CASE REPORT

Case number 344069, a 61 year old man, entered the Emergency Room of the Henry Ford Hospital on November 7, 1953 at 6 p.m. with the complaints of "stuffy nose, shortness of breath and hives."

The patient had eaten no food from early morning until his evening meal, prior to which he had drunk approximately one ounce of bonded whiskey. The meal consisted entirely of shrimp fried in hydrogenated vegetable oil. Symptoms occurred within ten minutes after eating the shrimp and he was brought immediately to the Emergency Room. He had a previous history of mild hives on several occasions for which specific causative factors were not elicited. There was a past history of chest tightness which occurred with upper respiratory infections and during the cold weather. The patient had never had hay fever and there was no family history of allergy. He had eaten shrimp, lobster, and other shell fish previously with impunity. For three weeks prior to the presenting illness he had been receiving penicillin injections from his family physician for a rectal abscess, with gradual clearing of the lesion. The last injection had been given two days prior to his admission.

This man had enjoyed good health throughout his life. There had been no symptoms of angina pectoris, coronary artery disease or congestive heart failure.

PHYSICAL EXAMINATION:

The patient, a moderately obese colored man, was scratching many areas of urticaria. When first seen he appeared rational and well oriented. The temperature was 97.6° F., the pulse was weak and rapid, and the blood pressure was 50 mm. Hg systolic and 40 diastolic. There was rhinorrhea and bilateral conjunctivitis. The retinae were not unusual. Examination of the throat, chest and abdomen were normal. Rapid faint heart tones were noted. Deep tendon reflexes were equal and active. During the examination the patient became disoriented, and stated he "must get some air." Against advice, he arose from the examining table

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but immediately needed support as he started to collapse. The blood pressure was again found to be 50 mm. Hg systolic and 40 diastolic. Intravenous administration of 5% glucose and sterile water containing 4 mgm. of nor-epinephrine was started immediately. The blood pressure promptly rose to 110 systolic and 70 diastolic, orientation returned, and the hives subsided.

After two hours, the blood pressure and pulse remained at satisfactory levels and the nor-epinephrine was discontinued. Coronary artery occlusion was considered as a probable cause of the severe hypotension and the patient was admitted to the hospital for further observation.

An electrocardiogram taken soon after the intravenous medication was started showed a P-R interval of 0.24 seconds. The hemoglobin on admission was 12 grams %. Twelve hours later, the hemoglobin was 11.1, RBC 4,980,000, WBC 23,000, polys. 74, eos. 1, lym. 24, and mono. 1. The serological test for syphilis was negative and the urinalysis was normal. The blood NPN was 30 mg. %, and the fasting blood sugar was 126 mg. %. Four days later the blood count was as follows: hemoglobin 13.1, RBC 3.76, WBC 6,150, polys. 65, eos. 6, baso. 1, and lym. 27. Electrocardiograms taken four and twenty one days after the hypotensive period were similar to the first.

Skin testing with protein substances (animal epidermals, pollens, molds, and bacteria) showed no significant reaction. After it was learned that the patient had eaten shrimp prior to the onset of the original symptoms, scratch tests for clam, oyster, lobster and shrimp were applied. Tests with these substances showed an immediate skin reaction characterized by marked erythema and whealing, with pseudopodia extending along adjacent lymphatic channels. Within ten minutes after skin testing the patient complained of chest tightness and the pulse rate increased from 72 min. to 96 min. The blood pressure was 118 systolic and 70 diastolic. Three minims of epinephrine were given subcutaneously with marked relief of symptoms. Subsequent tests for other foods, including fish and cotton seed (contained in vegetable fat preparations), showed no reactions. Passive transfer of the antibodies from the patient to normal subjects was accomplished by the method outlined by Prausnitz and Kustner. (2) In this procedure 0.1 cc. of the patient's serum was injected intracutaneously into three individuals previously proven to be non-sensitive to shell fish proteins. Subsequent testing at these sites of passive inoculation revealed positive reactions to all four members of the shell fish group.

COMMENT:

The characteristic symptoms of allergic shock occur most frequently following administration of pollen extract, serum, or other injectable substances. Reviewing the literature from 1895 through 1935 and reporting on the probable frequency of human anaphylaxis, Vaughan and Pipes (3) found 69 cases of severe shock or death. Two of these cases were presumably due to food hypersensitivity. In such instances the mechanism of the reaction seems to depend upon three factors: (1) the degree of the patient's sensitivity, (2) the dosage of the antigenic material and (3) the rate of absorption of the antigen. The accelerated skin reactivity to the scratch test for shrimp implies that our patient was markedly hypersensitive

Fig. 1

Fig. 2

Fig. 1—Control shows intradermal injection of 0.1 cc. of shrimp antigen in non-sensitized site in non-allergic subject.

Fig. 2—Results of intradermal injections of 0.1 cc. of shrimp antigen in same subject at site of passive transfer inoculation with patient's serum.

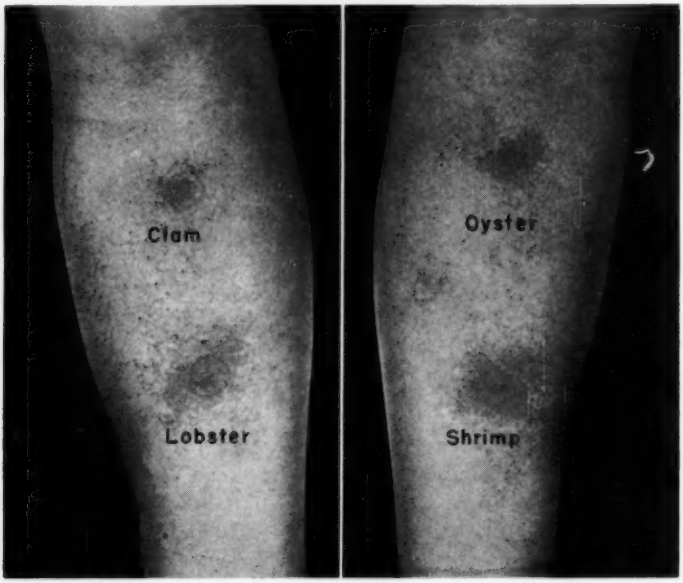
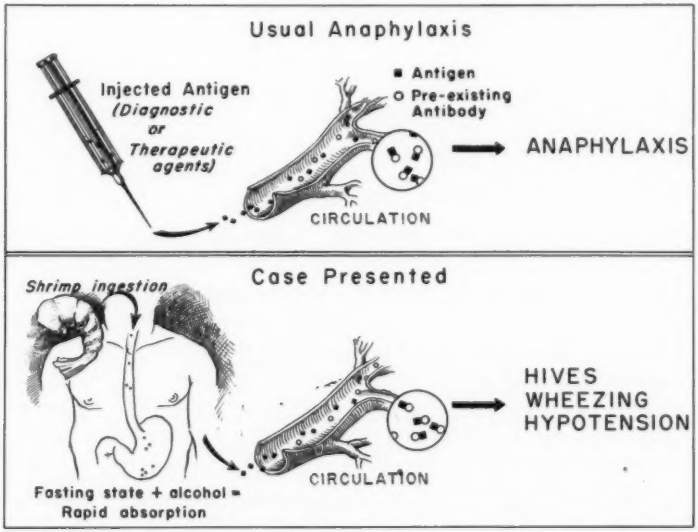


Fig. 3—Scratch tests for various shell fish at site of passive transfer inoculation in non-allergic subject, showing antigenic relationship between members of these groups.

to this material. This is compatible with Cooke's observations (4) that immediate allergic responses (within 30 min.) following food ingestion may be confirmed by skin testing. This was further verified by the demonstration of circulating antibodies in our patient's serum by the passive transfer test. This is shown in Figures I, II and III.

It is well recognized that fish, especially of the shell fish type are highly antigenic and will provoke considerable reactivity in susceptible individuals. Tuft and others (5) have shown that multiple sensitivities to members of the fish family exist, and that there is a common antigenic relationship between members of the Crustacea and Mollusca species. This was well demonstrated in our patient by the presence of immediate skin reaction to all members of these species, although only shrimp was considered clinically significant.

The patient had eaten no food since early morning. Furthermore, the presence of alcohol presumably facilitated the absorption of shrimp from the intestinal tract in sufficient amounts to cause a generalized hypersensitive response. In all probability, absorption occurs as an intact protein substance. Walzer (6) has shown experimentally that immediate positive skin reactions can occur at the site of passive transfer inoculation following oral ingestion of specific antigenic substances. Our patient could therefore fulfill all three criteria necessary for anaphylaxis; namely, *increased sensitivity* and *prompt absorption* of a *highly antigenic substance*. This is demonstrated in diagramatic form in Figure IV.



The electrocardiographic findings of a prolonged P-R interval, persisting after recovery, indicates a mild conduction defect probably of arteriosclerotic origin and not due to the allergic reaction or the pharmacologic effect of nor-epinephrine. Coronary vasculitis and cellular infiltration of the myocardium have been reported

during allergic states, and confirmed by post-mortem studies. (7-8) These entities were not felt to be present in the case reported since the electrocardiographic changes persisted long after the allergic manifestations had subsided. It is possible that some cases of unexplained sudden death, usually attributed to myocardial infarction, are actually episodes of fatal anaphylaxis due to food.

It seems unlikely that the attack could represent a delayed anaphylactic response to penicillin, in view of the two day interval between the last injection and the presenting symptoms. Furthermore, prompt and sustained recovery with antiallergic measures is the exception rather than the rule in delayed penicillin reactions.

We cannot explain the initial leucocytosis of 23,000. Wintrobe (9) has reported a leucopenia in anaphylactic shock and other allergic states, including serum sickness. Vaughan (10) has used the leucopenic index as a measure of individual sensitivity to ingested substances, but this procedure has not met with universal approval.

SUMMARY

A case of serious hypotension thought to be due to shrimp ingestion is reported. Such an occurrence depends on the rapid absorption of highly antigenic substances to which the subject is hypersensitive. A careful history is essential in determining the etiologic factors involved in such cases. Skin testing and passive transfer of antibodies was used to confirm the allergic response. It is possible that some cases of unexplained sudden death are due to allergic shock.

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ABSTRACTS OF RECENT PUBLICATIONS OF THE PROFESSIONAL STAFF OF THE HENRY FORD HOSPITAL AND THE EDSEL B. FORD INSTITUTE FOR MEDICAL RESEARCH

DUPLICATION OF THE MITRAL VALVE. Harold E. Bowman and Frank F. Forry. Lab. Invest. 2:454, 1953.

The paucity of reports in the literature concerning cases of duplication of the mitral valve would indicate the rarity and unusual nature of this anomaly. This is particularly true when the two orifices are of equal size. This case report concerns the fourth of such cases to be reported. A new case of mitral valve duplication is added to the literature.

DIAGNOSIS AND MANAGEMENT OF ACUTE PANCREATITIS IN GERIATRIC PATIENTS. Brock E. Brush, Ralph Carlson, and Frank Zeller, Jr. J. Am. Geriatrics Soc. 1:766, 1953.

Acute pancreatitis should be considered in the differential diagnosis of every severe upper abdominal pain. Because only the very severe forms of the disease have been sufficiently stressed in the literature, we feel that many of the less dramatic and less fulminant cases are not recognized, and thus proper treatment is not instituted as early as would otherwise be possible. The acceptance of an elevated blood diastase or amylase value as evidence of pancreatitis has led to the recognition of several forms of the disease, giving clinical pictures varying greatly in degree. The findings in a group of 31 patients over the age of 65 years with acute pancreatitis provide the data for this report. Prior to 1935 patients in the early stage of acute pancreatitis were operated upon, and the mortality was 45 per cent. During the past five-year period, 1945-1950, 122 patients were treated by conservative nonoperative measures, with only 3 per cent mortality. In the group of 31 patients over the age of 65 (all with a blood diastase level above 30 per cent of normal), there were 3 deaths. One of these was in a severe diabetic with a diastase value 640 per cent above normal and blood sugar level of 344 mg. per 100 cc.; the second was in a patient who had a concomitant attack of coronary disease, and the third was in a patient who had severe acute pancreatitis with a stone impacted at the sphincter of Oddi.

MODIFIED TECHNIQUE FOR TOTAL COLECTOMY IN ULCERATIVE COLITIS. Laurence S. Fallis and James Barron. Arch. Surg. 67:363, 1953.

The modern concept of the operative treatment of ulcerative colitis is that when surgical intervention is indicated the objective of the surgeon should be complete colectomy and that ileostomy should be considered only as the first step of a two-stage procedure that will finally result in the extirpation of the entire colon including the rectum. The history of the surgery of ulcerative colitis, as

exemplified by the gradually increasing scope of the surgical intervention, is a fascinating story of surgical progress. The first surgical procedures were aimed at providing a means of irrigation of the diseased colon with antiseptic solution, but the futility of appendicostomy and cecostomy was soon manifest. Ileostomy alone, in spite of its frequent employment as a last-resort measure, had a much longer vogue. Deflecting the fecal current by ileostomy frequently was a lifesaving measure, but complications arising in the diseased colon, such as acute exacerbation of the disease, arthritis and dermatitis due to toxic absorption, fistula formation, pseudopolyposis, cancer, etc., indicated the necessity for colectomy. Graded resection of the colon soon yielded to complete colectomy. The removal of the whole colon and rectum, while not the formidable procedure it once was, still is an operation of considerable magnitude. In an endeavor to reduce the extent of the operation the colon and rectum have been removed through an abdominal incision. This technique has been used in 12 operations. Noteworthy were the good general condition of the patient at the conclusion of the operation, the rapid convalescence, and the lessened morbidity.

PROBLEM OF CARCINOMA—IN-SITU; HISTOPATHOLOGISTS' POINT OF VIEW. Frank W. Hartman. *In* Symposium on Exfoliative Cytology, Oct. 23-24, 1951. New York, American Cancer Socity, 1953.

The topic is recognized as one of the most controversial in the field of cancer diagnosis and treatment at the present time. In fact the subject may be said to be controversial on four separate and distinct counts. First, as to the actual translation and meaning of the phrase; second, as to the definition and description of the lesion if it is accepted as a pathological entity; third, as to the type and number of clinical and laboratory diagnostic procedures adequate and acceptable for determining the presence or absence of this lesion; and fourth, as to the significance and management of the process, especially as related to carcinoma as ordinarily defined.

ETIOLOGY AND MANAGEMENT OF HYPOFIBRINOGENEMIA OF PREGNANCY. C. Paul Hodgkinson, R. R. Margulis, and J. H. Luzadre. J. A. M. A. 154:557, 1954.

Incoagulable blood as the result of hypofibrinogenemia is an obstetric syndrome of unusual clinical significance. Death from unmanageable hemorrhage may be the penalty. Two obstetric complications leading to hypofibrinogenemia and defective blood coagulation are compared. The abruptio placentae type causes fibrinogen-fibrin conversion as the result of absorption into the maternal circulation of thromboplastin. Symptoms are coincident with placental separation. In the macerated stillborn type the onset of symptoms is gradual and is not dependent on placental separation. Several possible causal factors are discussed. Successful treatment depends on elevation of the blood fibrinogen above the critical level of about 90 mg. per 100 cc. Natural regeneration of fibrinogen is prompt. Administration of fibrinogen is of proved value, but fibrinogen is not commercially available. Until it is, obstetricians must depend on whole blood

transfusions in the treatment of hypofibrinogenemia. Some evidence is presented that corticotropin or cortisone may be of value in the treatment of the macerated stillborn type of hypofibrinogenemia.

SYNDROME OF ANEMIA, DYSPHAGIA AND GLOSSITIS (Plummer-Vinson Syndrome). James T. Howell and Raymond W. Monto. New England J. Med. 249-1009, 1953.

An iron deficiency anemia associated with dysphagia and glossitis in women between forty and fifty years of age, is now known as sideropenic dysphagia. The anemia is microcytic, hypochromic, and may be profound. The mucous membranes of the throat are extremely friable and readily broken down with passage of the endoscope. Two cases are reported, one cured by intravenous use of iron while the patient was on a full diet, the second cured by hyperalimentation, special tube feedings reaching 4000 calories per day.

SEQUENTIAL ELECTROCARDIOGRAPHIC CHANGES FOLLOWING AURICULAR INJURY. Thomas N. James and Thomas Geoghegan. Am. Heart J. 46:830, 1953.

Information regarding the auricular electrocardiographic component is impressively meager when compared to the available data on the ventricular component. Experimental auricular injury has been produced by a new method, the injection of air into the left ventricular cavity. The advantages of this method are discussed. Continuous direct auricular electrocardiograms were made until the cessation of all cardiac electrical activity. Auricular injury patterns with this method exhibited a consistent sequence in all animals. These began with a displaced P-T_a segment which evolved into a sharp auricular T wave. Initial evidence of injury appeared simultaneously in both the auricular and ventricular complexes.

SURVIVAL RATES AFTER MYOCARDIAL INFARCTIONS WITH AND WITHOUT LONG TERM ANTICOAGULANT THERAPY. John W. Keyes, Ellet H. Drake, Thomas N. James and F. Janney Smith. Am. J. M. Sc. 226: 607, 1953.

The use of anticoagulants on a long term basis improved the prognosis of patients with either single or recurrent myocardial infarctions, over a 2-year period studied. The results were statistically significant. In general approximately four times as many patients died without the long-term anticoagulant therapy, as did with it. Since therapy is associated with some risk, it should only be attempted after careful evaluation of the patient. Of the control group of 106 patients, 13 died during the first year, and 13 more during the second year. Of the treated group of 31 patients, 1 died during the first year, and of 20 followed the second year, none died.

THE TREATMENT OF BURNS. Conrad R. Lam. *In* Ficarra, B. J. Emergency Surgery, F. A. Davis Co., Philadelphia, 1953.

The improved prognosis for the survival of the burned patient and for the restoration of his function has been more the result of apparently solid advances in many details of treatment rather than a single important specific discovery. Specific instructions are given for first aid treatment, and the following instructions for treatment of minor industrial burns—Wash the area with soap and water, if it is dirty. Do not break blisters or otherwise "debride" the wound. Cover with fine mesh gauze impregnated with petrolatum jelly. Apply a firm dressing over this, bulky enough to keep dirt away from the injury but not so large as to keep the man off his job. A careful outline of burn treatment for hospital care must include giving morphine for pain, charting extent of burn, and applying dressings or beginning exposure treatment.

First three days: Give attention to blood volume and urinary output; antibiotics. Next two weeks: Give attention to nutrition and continue antibiotics. Do not disturb dressings except on burns of minor depth. At end of period, remove dressings. If burns are healed, discharge patient. If deep second degree burns are unhealed, replace dressings. If sloughing of third degree burns is not complete, apply wet compresses for two days. After third week: Discharge patient or proceed with skin grafting. Skin grafting procedures are often life saving, not elective procedures to be carried out at convenient time. The Padgett dermatome, or its equivalent, has permitted an almost miraculous type of skin replacement. The secret of success in the management of large third degree burns is to graft, and graft, and graft again.

PROBLEM OF THE HIATUS HERNIA OF THE DIAPHRAGM. Conrad R. Lam and Leo J. Kenny. J. Thoracic Surg. 27:1, 1954.

The unsatisfactory general status of the surgical treatment of esophageal hiatus hernia has led to a review and analysis of the subject by eight cadaver dissections. A detailed procedure for repair is described and illustrated, and a review of thirty-eight cases is reported. An anatomically sound repair with closure of the opening by sutures placed posterior to the esophagus, as recommended by previous authors appears to give the best success.

ERYTHROMYCIN IN LOCAL TREATMENT OF CUTANEOUS BACTERIAL INFECTIONS. Clarence S. Livingood, Elizabeth S. Head, Edwin A. Johnson and Samchai Nilasena. J.A.M.A. 153:1266, 1953.

Our experience with the topical use of erythromycin in the treatment of cutaneous bacterial infections is reported; a total of 184 patients is included in this series. The majority of these patients were treated with a 0.5% ointment. A combination of neomycin-erythromycin ointment was used in some cases. It appears that erythromycin is a very effectivet opical therapeutic agent for staphylococcic and streptococcic primary cutaneous infections; the results in secondary bacterial infections were variable. Results of in vitro tests for 60 strains of hemolytic Staphylococcus aureus and 49 strains of beta hemolytic streptococci are re-

ported; drugs used in this in vitro study included erythromycin, chlortetracycline (aureomycin), oxytetracycline (terramycin), penicillin, neomycin, bacitracin, and a combination of equal parts of bacitracin and neomycin sulfate. Three patients had an apparent sensitivity or irritant reaction to erythromycin, and two additional patients had a similar reaction following application of the neomycin-erythromycin combination ointment. One of the ointment bases (lanolin) was not tolerated in three other patients. It is possible that erythromycin is not as well tolerated by denuded and eczematized skin as certain other antibiotics.

MANAGEMENT OF THE PATIENT DYING OF BACTERIAL PNEUMONIA. Howard R. Marvel, E. L. Belknap, Jr., and Ben E. Goodrich. Dis. Chest 25:70, 1954.

Patients with bacterial pneumonia usually recover promptly when given modern antibiotic preparations. Choice of the antibiotic for each case continues to be discussed as the major responsibility of therapy. Reported mortality rates range from 5.7 to 9.3 per cent. Deaths occurring with this frequency from infectious processes indicate an opportunity for improving treatment. In the period from 1948 to 1951 nine patients died from bacterial pneumonia, during which time 163 cases were admitted. The uncorrected mortality rate was 5.5 per cent. The records of fatal cases were analyzed and the reports indicate some of the problems encountered in patients who die under hospital management. Known effects of the steroid hormones on the tissue reaction to infection furnish theoretical objections to their use in bacterial pneumonia. The present study revealed no injury to tissue or to patient resulting from the use of these agents. In conjunction with antibiotics and other measures, blood cultures remained sterile, no extension of infection to other lobes occurred, no complications were observed, and recovery was uneventful. Of 163 consecutive cases of bacterial pneumonia nine died. Seven of these were autopsied and in five adrenal damage was present. Pressor amines and adrenal cortical supplements have appeared to maintain life until body processes and antibiotics have controlled the infection.

*DIFFUSION COEFFICIENT AND MOLECULAR WEIGHT OF ALKALINE PHOSPHATASE. James C. Mathies and E. D. Goodman. J. Am. Chem. Soc. 75:6061, 1953.

In 1935, diffusion experiments on alkaline phosphatase from swine kidneys were reported. The molecular weight of the enzyme was calculated to be 6,000 to 10,000. This is an exceptionally low value for the molecular weight of an enzyme. It was also observed that serum alkaline phosphatase was associated with serum globulins in the ultracentrifuge. Hence a redetermination of the diffusion coefficient of the enzyme appeared of value. The differential diffusion coefficient for several types of alkaline phosphatase has been determined using the diaphragm cell method. An average value of 0.0192 cm. per day was obtained at 5°. Molecular size estimations from these data, making the usual assumptions as to shape and density, are from 500,000 to 1 million, with the best estimation being 800,000. No significant difference was detected with respect to this property, between in-

testinal and kidney alkaline phosphatase, the latter enzyme being obtained from three species.

DEVELOPMENTAL ABNORMALITIES OF THE DUODENUM PRODUCING OBSTRUCTION. Richard F. McClure and Elmer F. Wahby. Radiology 61:516, 1953.

The embryological development of the duodenum and its peritoneal membranes is so complicated that obstructing anomalies are sometimes present after birth. Although such congenital duodenal obstructions are uncommon, their mortality rate is so high that they assume a most important role among diseases of infants and children. Congenital anomalies of the duodenum have their origin in delay or arrest of development at some stage in the embryology of the duodenum. The common congenital obstructing lesions are atresia, stenosis, and cholecystoduodenocolic membranes. These congenital membranes have been aptly described as "veils" and may exist as a thin band or as many fine strings of tissue forming a web over the duodenum. Excellent roentgenograms and sketches are shown to illustrate the duodenal obstruction.

*PREPARATION, PROPERTIES, AND CRYSTALLIZATION OF TUNA PEPSIN. Earl R. Norris and James C. Mathies. J. Biol. Chem. 204:673, 1953.

Former studies demonstrated that gastric proteolytic enzymes of fish differ in crystal structure, specificity, and other properties from the crystalline pepsins of warm blooded animals. Studies are here reported on pepsin of tuna, particularly the eastern Pacific yellow-fin tuna (*Thunnus albacares*), but also including bluefin tuna (*Thunnus thynnus*) and albacore (*Thunnus germo*). Details of the procedures are given. These pepsins were found to crystallize in needles having a specific activity higher than that of other pepsins isolated to date.

*A STUDY OF THE PROPAGATION MODE FOR METALLIC VAPORS IN SHADOW-CASTING BY VACUUM EVAPORATION OF AU_{198} AND CR_{51}. L. E. Preuss. J. App. Physics 24:1401, 1953.

The radioactive isotope technic has provided an extremely sensitive tool for investigation of the evaporation scheme of metals in shadow-casting. It is particularly useful in the analysis of tenuous films below the sensitivity limit of conventional methods. It has been shown that each crucible type exhibits a characteristic evaporation dispersion pattern with none demonstrating symmetrical radial dispersion, while the majority tested produced patterns at great variance with the inverse-square law; this latter denying the efficacy of the empirical thickness formulas since their inverse-square prediction may err by a factor of ten from the true deposit.

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PSEUDODIVERTICULUM OF THE ESOPHAGUS ASSOCIATED WITH CARDIOSPASM. Robert J. Priest and Conrad R. Lam. Gastroenterology 25:393, 1953.

H.B., a 45-year-old white housewife, was first seen in this clinic on July 9, 1948 with the complaint of choking spells after eating. For 30 years the patient had had intermittent attacks of dysphagia. She had the sensation of obstruction high in the esophagus. Following the death of her husband four years prior to her hospital admission, these symptoms had become increasingly severe and more frequent. Roentgen examination revealed a large pouch involving the upper third of the esophagus. This gave the appearance of being a pulsion diverticulum. It filled with barium and then spilled over on the right side to pass into the lower esophagus. The esophagus showed marked dilation and hyperperistaltic activity. There was narrowing at the cardia and only a small amount of barium passed into the stomach during the fluoroscopic examination. The patient was esophagoscoped. As the introitus was entered, a partition was seen with openings on the right and left. The opening on the left was extremely large and admitted the esophagoscope. This was the entrance to a large pouch with a diameter larger than the esophagus itself. It was separated from the esophagus by a wide partition. The esophagus was examined through the opening on the right. It was found to be greatly dilated and filled with fluid and old food particles. The cardia was narrowed and could not be passed. Diagnosis was made of cardiospasm with megaesophagus. Radical surgical treatment consisting of cardioplasty and excision of the diverticulum was carried out. After the operation the patient was able to eat solid food and had no regurgitation. She has remained well for four years.

CYTOLOGY OF THE TUBERCULIN REACTION IN SKIN WINDOWS IN MAN. John W. Rebuck and J. Lewis Yates. Am. Rev. Tuberc. 69:216, 1954.

The leukocytic cycles in acute inflammation in experimental animals were described originally by Metchnikoff. The basic sequences consisted of an early migration of phagocytic granulocytes reinforcing available tissue macrophages. These phagocytes were supplemented by migrating lymphocytes and blood mononuclears (monocytes) which hypertrophied to form additional macrophages. Recently the present writers have reviewed the experimental work reaffirming these basic cellular concepts by advanced techniques and have confirmed this description of the acute inflammatory cycle in skin windows in man. The present communication is a preliminary report of a technique which will permit tissue examinations to be performed repeatedly in the same subject in different stages of the tuberculin reaction in the same lesion. Furthermore, subsequent lesions can be similarly studied in the same person. The successions of leukocytic migrations and participation were studied in 5 lesions in tuberculin negative, and in 9 lesions in tuberculin positive volunteers. Defective and retarded mononuclear responses were observed in the latter group, which sometimes led to neutrophilic exaggeration.

INTERRUPTION BY TOPICAL CORTISONE OF LEUKOCYTIC CYCLES IN ACUTE INFLAMMATION IN MAN. JOHN W. REBUCK and RAYMOND C. MELLINGER. Ann. New York Acad. Sci. 56:715, 1953.

A series of permanent fixed preparations of in vivo samplings of the cellular exudates were obtained from acute inflammatory lesions in man. The epithelium was scraped away from a small area of skin, after which an inflammatory excitant (diphtheria toxoid) was applied and the lesion covered with a cover slip. Within an hour the cells of the inflammatory exudate had migrated to the under surface of the cover slip. When such migration had been effected, the cover slip was removed and additional cover slips were placed over the same lesion at timed intervals. The preparations so obtained were air-dried and stained like blood smears. The time at which the epithelium was removed marked the time inflammation began. At 8 to 12 hours, lymphocytes were present in increasing numbers. Subsequent to topical application of cortisone, there was marked depression of lymphocytic participation at the 8-12 hour period of inflammation and, as a consequence of the hypertrophying lymphocytes, at 12 to 14 hours. Retardation and incompleteness of the cellular sequences were paralleled by depression of phagocytosis. The literature was reviewed with refence to impairment of defensive cellular units by ACTH, cortisone, or their equivalents at four graded levels, any one of which, if affected, could in turn modify local inflammatory responses (1) at the level of hematopoiesis, particularly lymphocytopoiesis; (2) during transport in the blood; (3) at the time of migration from the local vasculature and finally; (4) at the local inflammatory site.

CARCINOMA OF THE ORAL CAVITY AND JAWS. HAROLD F. SCHUKNECHT, JOSEPH H. LEEK, ROBERT M. APPLEMAN, and JAMES R. BLAYNEY. Oral Surg., Oral Med. & Oral Path. 6:1386, 1953.

Cancer of the mouth comprises over two-thirds of all cases of cancer of the upper respiratory and alimentary tracts. Men are affected about five times as frequently as women. Several factors are known to be of some importance in the etiology of cancer of the mouth. Cancer of the anterior half of the tongue can be treated equally well by radiation or surgery. Cancer of the posterior half of the tongue is always treated by radiation. Although cancer of the lip is considered beyond the scope of this article, it may be stated that most cases are treated by radiation with good results. Except for radiosensitive tumors, cancer of the maxilla should be treated by block dissection when there is a chance for complete removal. It is our practice to follow with radiation therapy in all these cases. Because cancer is invasive and destructive it is not possible by gross inspection to define the exact limits of a lesion. Surgery must be an adequate attempt to remove the lesion completely, and to do this a wide margin of supposedly normal tissue must be taken.

EAR, NOSE AND THROAT EMERGENCIES. HAROLD F. SCHUKNECHT. M. Clin. North America 38:241, 1954.

There are many ear, nose and throat emergencies which any well trained physi-

cian can capably diagnose and treat. There are some emergencies which require active temporary management until a specialist can be summoned for definitive care. The purpose of this paper is to discuss for the nonspecialist the management of some of the most common emergencies in this field. The treatments presented have been successful in the author's hands. There may be other methods of management which are equally successful. The following emergencies are considered. Nosebleed, acute suppurative otitis media, acute otitis externa, aerootitis media, peritonsillar abscess, retropharyngeal abscess, acute frontal sinusitis, toothache, trigeminal neuralgia, foreign bodies in the air passages, trauma to the larynx, laryngotracheobronchitis, secretional obstruction of the respiratory tract, laryngotomy and tracheotomy, early treatment of facial injuries, fracture of the mandible, fracture of the zygoma, fracture of the nose.

LESIONS OF THE ORGAN OF CORTI. HAROLD F. SCHUKNECHT. Trans. Am. Acad. Ophthal. and Otolaryn. 57:366, 1953.

The study of cochlear pathology in animals with experimentally produced deafness has provided sufficient new information to justify an attempt to correlate it with some of the psychoacoustic phenomena associated with deafness. The following methods were used to produce the lesions: (1) needle punctures of the cochlea, (2) electrocautery after thinning the cochlear wall, (3) blows to the head, and (4) partial section of the cochlear nerve. Animal experiments seem to provide sufficient information on the functional and pathologic changes occurring in response to injury to justify the following conclusions: The outer hair cells are more sensitive than inner hair cells to most forms of injury. (An exception may be drug poisoning.) Hair cells may degenerate without imposing a degenerative change in the spiral ganglion. In experimental injuries to the organ of Corti it is the severity of pathologic change in the supporting elements, particularly the pillar cells, which best correlates with the degree of degeneration occurring in the spiral ganglion. Primary degeneration of the spiral ganglion produces no change in the organ of Corti or its hair cells. Menieres disease probably has its most severe effect on structures in the apex of the cochlea.

TECHNIQUES FOR STUDY OF COCHLEAR FUNCTION AND PATHOLOGY IN EXPERIMENTAL ANIMALS; DEVELOPMENT OF THE ANATOMICAL FREQUENCY SCALE FOR THE CAT. HAROLD F. SCHUKNECHT. Arch. Otolaryng. 58:377, 1953.

The dual purpose of this report is to describe techniques of evaluating the function and pathology of the cochlea in animals and to present information on frequency localization in the cochlea of the cat. Credit for developing the techniques belongs to such investigators as Culler and Neff for behavioral tests of hearing, Tunturi and Hind for the cortical test of auditory function, and Stacey Guild for the method of graphic cochlear reconstruction. The paper is divided into three sections: (A) tests of auditory function, including the behavioral method as used by Neff and the cortical method of Hind; (B) the study of cochlear pathology,

encompassing a description of standard histological technique and a description of Guild's method for graphic cochlear reconstruction, and (C) the development of the anatomical frequency scale for the cat, based on the results of recent investigations. The behavioral test depends on training the animal to walk forward in response to pure-tone stimuli. The cortical method is based on recording of evoked strychnine potentials from the auditory cortex, and is a complex observation. In seven experimental animals the two observations agreed well, but the behavioral test remains the only true test of hearing. The pinna reflex has been used to test hearing but lacks accuracy. Pathologic methods, and descriptions are given in detail for the study of the cochlea, the organ of corti, and the spiral ganglion. Finally the anatomical frequency scale is described as developed for the cat, and its application is shown in presentation of functional and pathologic changes in the cochlea.

THE VALUE OF GERIATRICS. FRANK J. SLADEN. *In* "Health in the Later Years," Gainesville, University of Florida Press, 1953.

Geriatrics is important because of the increasing numbers of older people. As the life span is extended, responsibility for this group becomes greater, especially as they are of high value to the community. Many industrial concerns are taking a liberal attitude in their compulsory retirement programs. Failing health has been traditionally associated with old age, but many well trained and experienced doctors find these problems of health interesting. Six major areas of interest are heredity, nutrition, body mechanics, endocrine status, infectious disease, and personality relationship. Older people do not enjoy being treated as a segregated group. All have the right to examination, to high standards of care, to hope of recovery, and especially to a doctor with devotion, and a sense of mission for these people.

A RADIOIODINE TRACER STUDY OF THE FATE OF HUMAN THYROID AUTOTRANSPLANTS. D. EMERICK SZILAGYI, JOHN L. BARRETT, EDWARD R. LONGABAUGH and LUTHER E. PREUSS. J. Clin. Endocrinol. and Metab. 13:1347, 1953.

The regenerative and growth capacity of human thyroid parenchyma has long been assumed by analogy with the results of animal experiments and on grounds of clinical observations following thyroidectomy. With radioisotope tracer technic a more direct method of evaluating the growth potential of human thyroid tissue became available. By this method we have formerly shown that following so-called "total" thyroidectomy grossly indiscernible fragments of thyroid tissue inadvertently left in situ are at times capable of a detectable function. Similarly, under certain conditions a consistent and progressive increase can be demonstrated in the functional activity of very small amounts (as small as 200 mg.) of thyroid parenchyma remaining after radical subtotal thyroidectomy. In the present study we have sought to gather further information regarding the parenchymal regeneration of thyroid tissue by investigating the behavior of thyroid

autotransplants. The clinical data and the results of radio-iodine uptake and excretion studies are presented and discussed in 9 cases of subtotal and total thyroidectomy in which thyroid autografts have been made. The transplants may resume the specific physiologic function of accumulating iodine as early as ten days postoperatively—probably as soon as their vascular connections are established. The functional activity of the transplants in terms of iodine uptake increases with time. The systemic demand for thyroxine and the age of the donor may be among the factors influencing the survival and growth of the transplant.

CLINICAL CARDIAC CATHETERIZATION IN INFANTS AND CHILDREN. ROBERT F. ZIEGLER. Pediat. Clin. North America 1:93, 1953.

The purpose of this paper is to discuss the clinical importance of cardiac catheterization, particularly in infants and small children, based largely on an experience of 825 cardiac catheterizations, 188 of which were done in infants from birth to one year of age. The youngest infant was nine days old, the oldest adult sixty-five years. Cardiac catheterization can be done safely and successfully at all ages, even during early infancy. Especially in infants and young children, catheterization of the heart is done under morphine-sodium phenobarbital sedation, using the saphenous system. In patent ductus arteriosus the diagnosis may be made by catheterizing the ductus itself or by establishing the presence of an aortic-pulmonary shunt as evidenced by an elevated pulmonary artery oxygen. There are two different syndromes of coarctation of the aorta in infants, depending on the site of the aortic insertion of the fetal ductus. Catheterization of the heart is of practical value in differentiating the various cyanotic defects, particularly tetralogy of Fallot and pulmonary valvular stenosis with closed intraventricular septum. Cardiac catheterization has proved that the Brock operation for valvular pulmonary stenosis has been highly successful in most cases.